

2SJ209-VB Datasheet

P-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 100	0.50 at $V_{GS} = - 10$ V	- 1.5	7.7
	0.56 at $V_{GS} = - 6.0$ V	- 1.4	

FEATURES

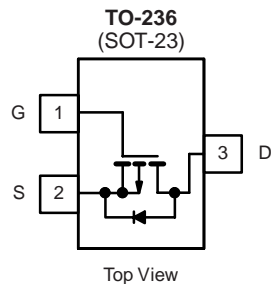
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET[®] Power MOSFET
- Ultra Low On-Resistance
- Small Size



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Active Clamp Circuits in DC/DC Power Supplies



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	5 s	Steady State	Unit
Drain-Source Voltage	V_{DS}	- 100		V
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C) ^{a, b}	I_D	$T_A = 25$ °C	- 1.65	- 1.5
		$T_A = 70$ °C	- 1.55	- 1.4
Pulsed Drain Current	I_{DM}	- 3.0		A
Continuous Source Current (Diode Conduction) ^{a, b}	I_S	- 1.4	- 1.0	
Single Pulse Avalanche Current	I_{AS}	4.5		mJ
Single Pulse Avalanche Energy		E_{AS}	1.01	
Maximum Power Dissipation ^{a, b}	P_D	$T_A = 25$ °C	2.0	0.85
		$T_A = 70$ °C	1.0	0.58
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^a	R_{thJA}	$t \leq 5$ s	75	100	°C/W
		Steady State	120	166	
Maximum Junction-to-Foot (Drain)	R_{thJF}	40	50		

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. Pulse width limited by maximum junction temperature.

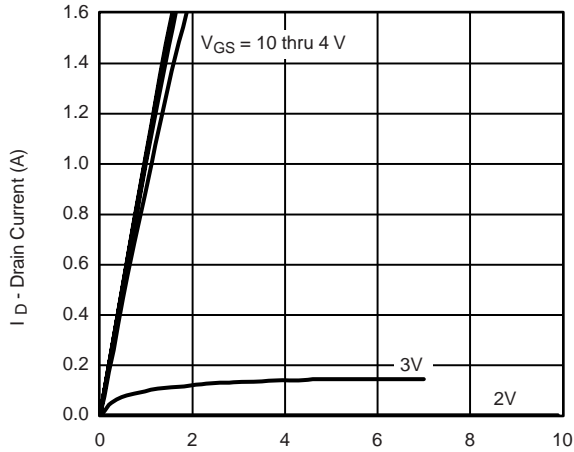
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 100			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1.0		- 3.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -15\text{ V}, V_{GS} = 10\text{ V}$	- 1.6			A
Drain-Source On-Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$		0.50		Ω
		$V_{GS} = -6.0\text{ V}, I_D = -0.5\text{ A}$		0.56		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -0.5\text{ A}$		2.2		S
Diode Forward Voltage	V_{SD}	$I_S = -1.0\text{ A}, V_{GS} = 0\text{ V}$		0.7	- 1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -50\text{ V}, V_{GS} = 10\text{ V},$ $I_D \cong -0.5\text{ A}$		7.7	12	nC
Gate-Source Charge	Q_{gs}			1.5		
Gate-Drain Charge	Q_{gd}			2.5		
Gate Resistance	R_g	$f = 1.0\text{ MHz}$		9		Ω
Input Capacitance	C_{iss}	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		520		pF
Output Capacitance	C_{oss}			40		
Reverse Transfer Capacitance	C_{rss}			20		
Switching^c						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -50\text{ V}, R_L = 75\text{ }\Omega$ $I_D \cong -1.0\text{ A}, V_{GEN} = -10\text{ V}$ $R_g = 6\text{ }\Omega$		7	11	ns
	t_r			11	17	
Turn-Off Time	$t_{d(off)}$			16	25	
	t_f			11	17	
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 0.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		90	135	nC

Notes:

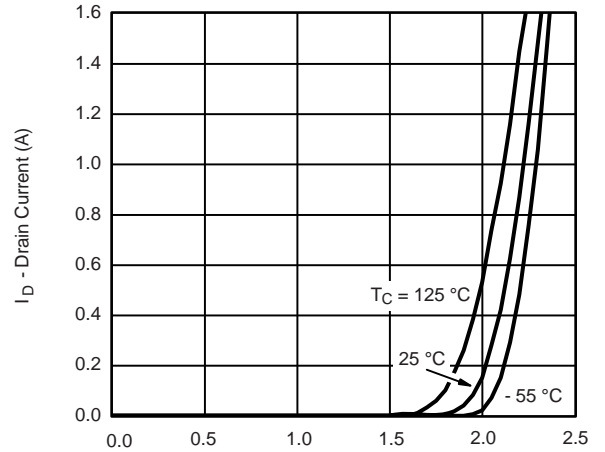
- a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.
 b. For DESIGN AID ONLY, not subject to production testing.
 c. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

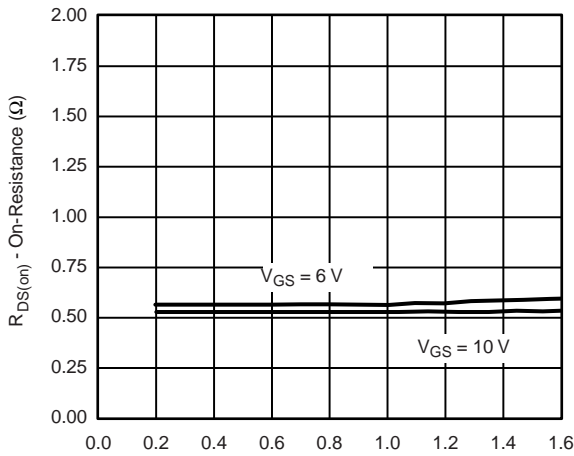
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



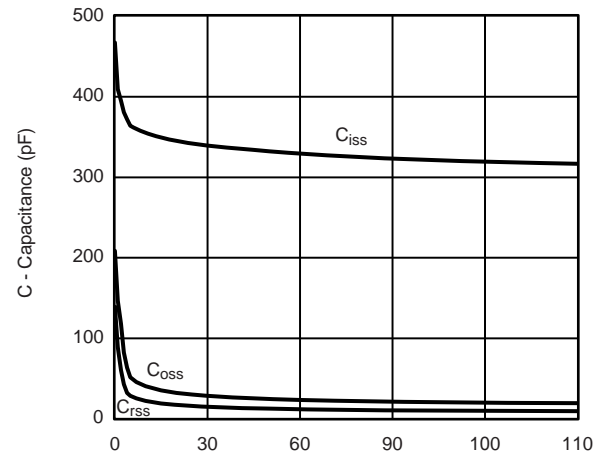
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



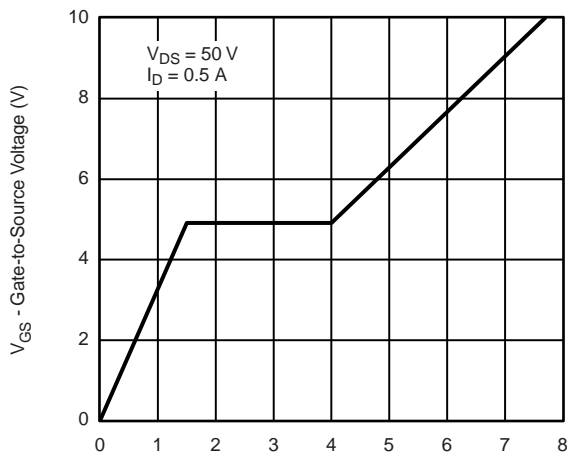
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



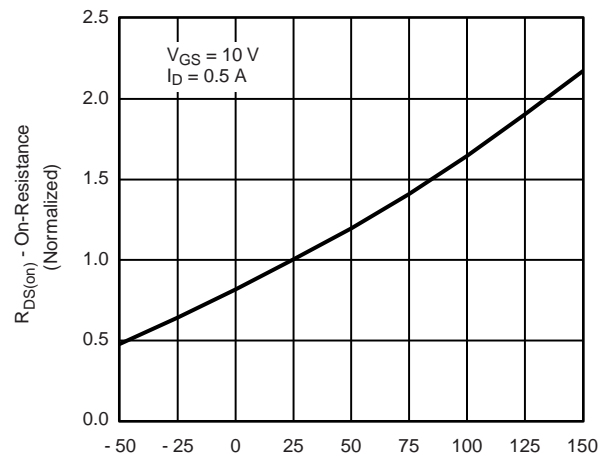
I_D - Drain Current (A)
On-Resistance vs. Drain Current



V_{DS} - Drain-to-Source Voltage (V)
Capacitance

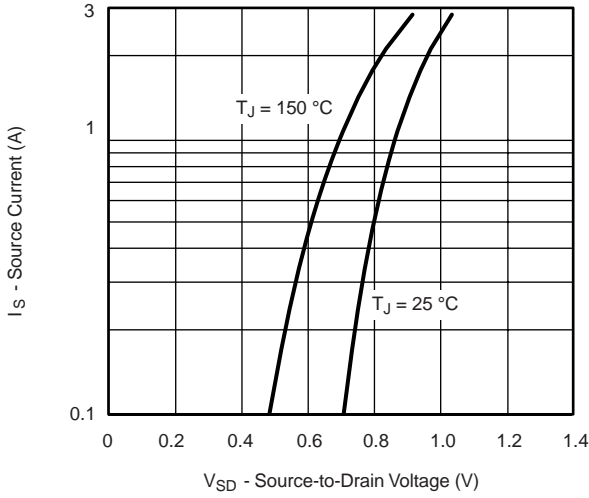


Q_g - Total Gate Charge (nC)
Gate Charge

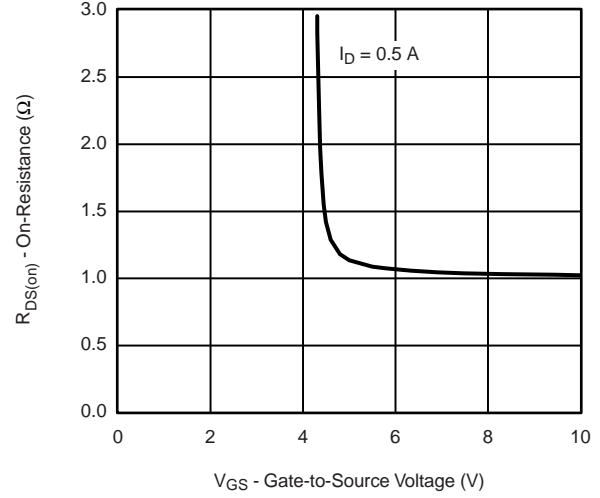


T_J - Junction Temperature ($^{\circ}C$)
On-Resistance vs. Junction Temperature

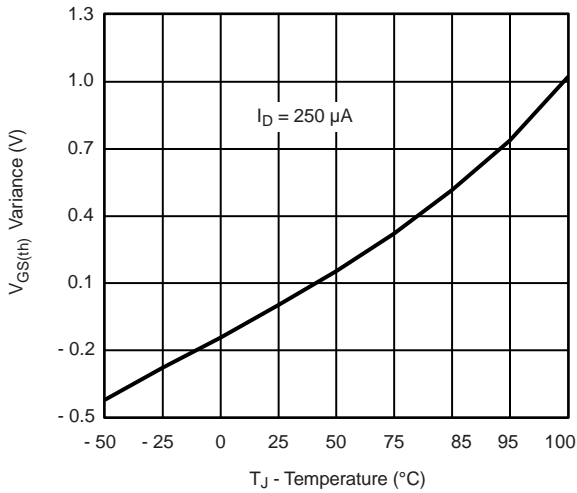
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



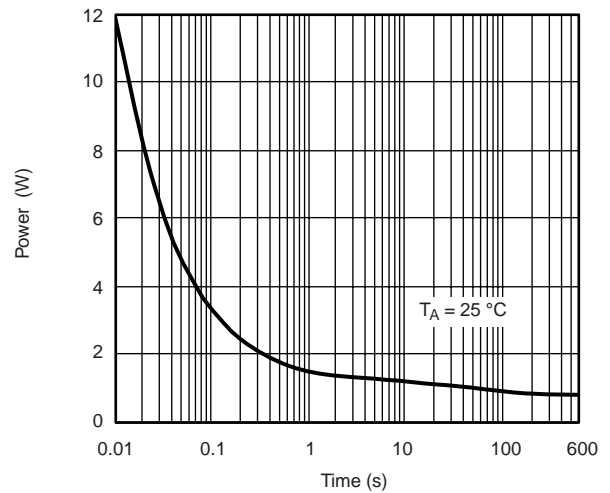
Source-Drain Diode Forward Voltage



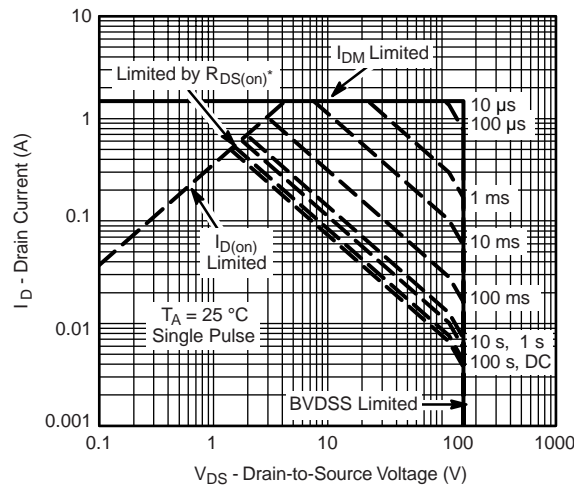
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



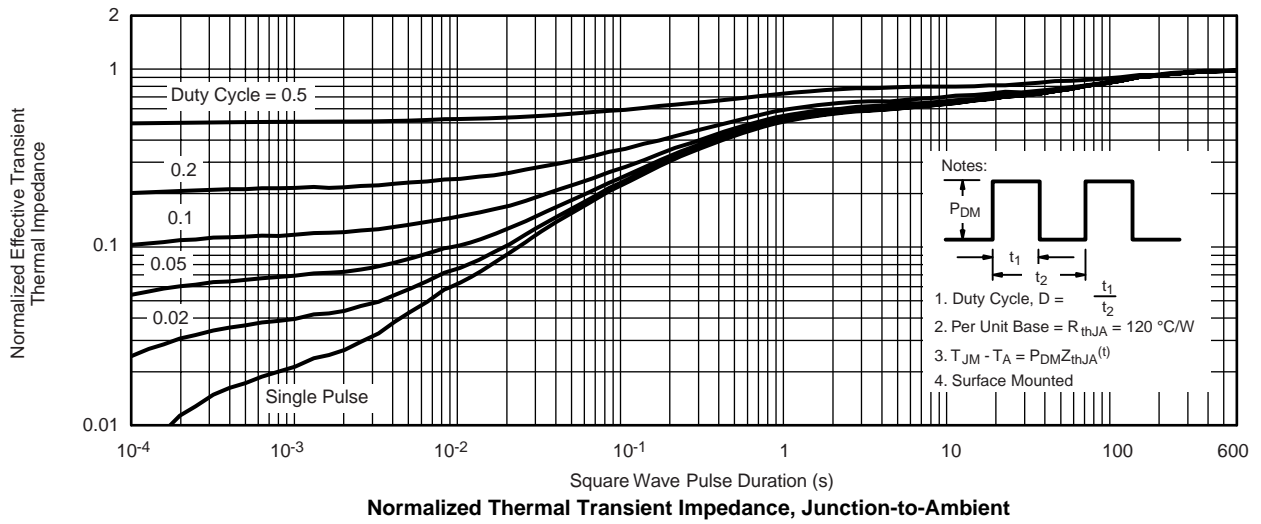
Single Pulse Power



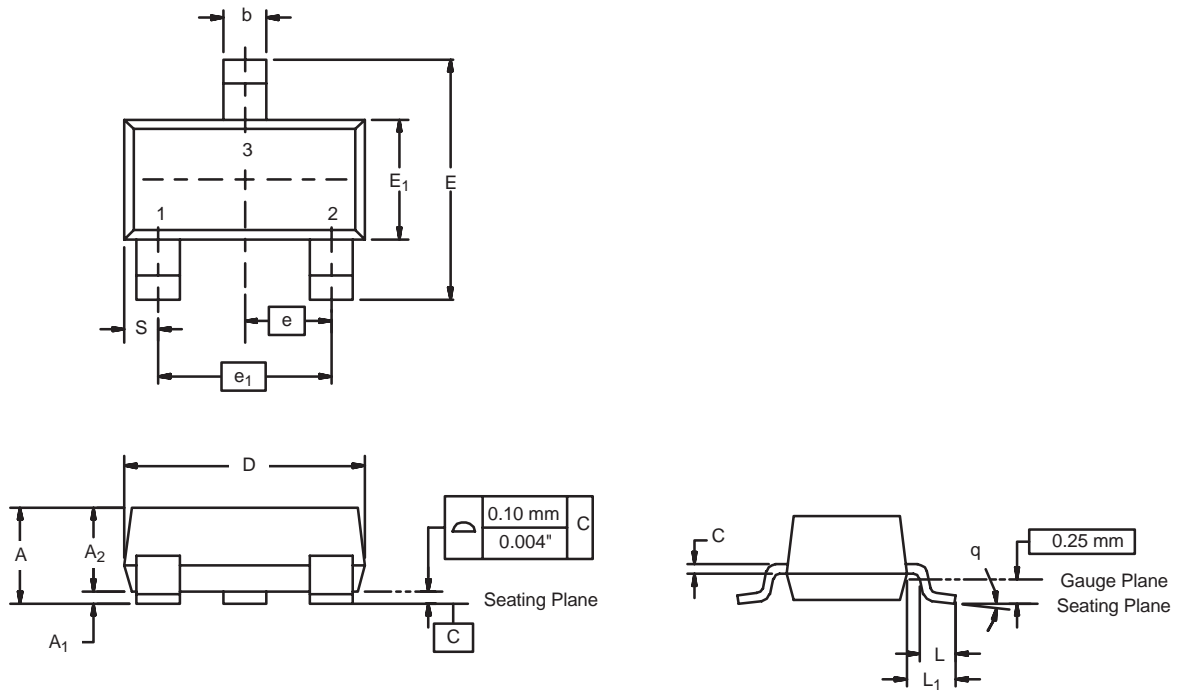
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



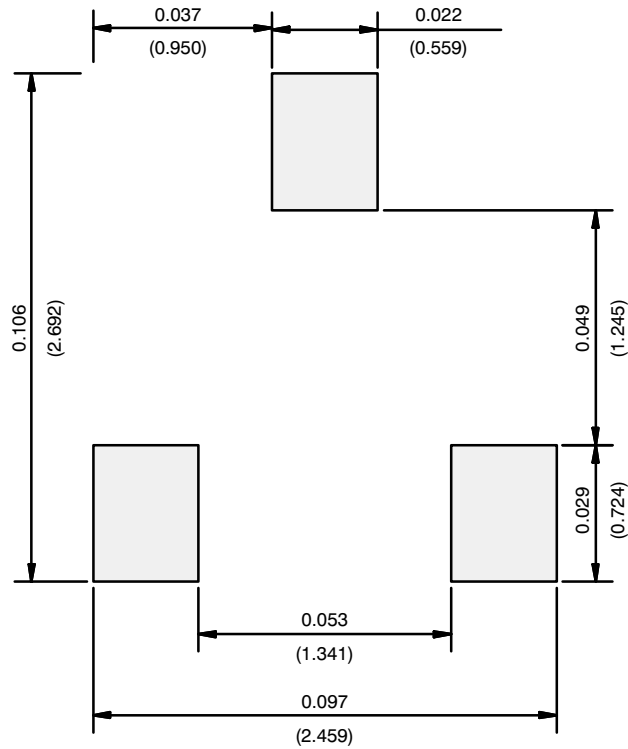
SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A ₁	0.01	0.10	0.0004	0.004
A ₂	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°

ECN: S-03946-Rev. K, 09-Jul-01
DWG: 5479

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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